

**WHAT IS CLAIMED IS:**

1. A three-dimensional image processing apparatus for generating a shadow model of a solid model formed by polygons each having vertex normal vectors, comprising:

vertex sorting means for sorting the respective vertices of the polygons forming the solid model into visible-surface vertices facing in a direction toward a light source and hidden-surface vertices facing in a direction opposite from the light source, and

shadow model generating means for deforming the solid model by moving the hidden-surface vertices in a propagating direction of rays from the light source.

2. A three-dimensional image processing apparatus according to claim 1, wherein the vertex sorting means sorts the vertices into the visible-surface vertices and the hidden-surface vertices based on whether an inner product of a normal vector of each vertex of each polygon and a light source vector representing the propagating direction of the rays from the light source is a positive or negative value.

3. A three-dimensional image processing apparatus according to claim 1, wherein the shadow model generating means moves specified vertices in parallel with the propagating

direction of the rays from the light source.

4. A three-dimensional image processing apparatus according to claim 1, wherein the shadow model generating means narrows distances between the specified vertices such that the hidden-surface vertices of the shadow model having the visible-surface vertices define a shape tapered in a moving direction.

5. A three-dimensional image processing apparatus according to claim 1, wherein the shadow model generating means widens distances between the specified vertices such that the hidden-surface vertices of the shadow model having the visible-surface vertices define a shape swollen in a moving direction.

6. A three-dimensional image processing apparatus according to claim 1, further comprising shadow creating means for sorting the polygons forming the shadow model into front-facing polygons facing in a direction toward a viewpoint of a virtual camera and back-facing polygons facing in a direction opposite from the viewpoint of the virtual camera, and creating a shadow image in pixels which are pixels corresponding to the front-facing polygons minus pixels corresponding to the back-facing polygons.

7. A three-dimensional image processing apparatus

according to claim 1, further comprising:

shadow creating means for creating a shadow image of the solid model using the shadow model,

first storage means for storing the created shadow image of the solid model,

second storage means for applying rendering to the polygon models except the shadow model and storing the thus created image, and

combining means for reading and combining the image stored in the first storage means and the one stored in the second storage means.

8. A three-dimensional image processing apparatus according to claim 1, wherein the solid model is a character movable in height direction in a simulated three-dimensional space.

9. A readable storage medium storing a three-dimensional image processing program for generating a shadow model of a solid model formed by polygons each having vertex normal vectors, the program comprising the steps of:

vertex sorting processing for sorting the respective vertices of the polygons forming the solid model into visible-surface vertices facing in a direction toward a light source and hidden-surface vertices facing in a direction opposite from the

light source, and

shadow model generating processing for deforming the solid model by moving the hidden-surface vertices in a propagating direction of rays from the light source.

10. A readable storage medium according to claim 9, wherein the vertex sorting processing is performed to sort the vertices into the visible-surface vertices and the hidden-surface vertices based on whether an inner product of a normal vector of each vertex of each polygon and a light source vector representing the propagating direction of the rays from the light source is a positive or a negative value.

11. A readable storage medium according to claim 9, wherein the shadow model generating processing is performed to move specified vertices in parallel with the propagating direction of the rays from the light source.

12. A readable storage medium according to claim 9, wherein the shadow model generating processing is performed to narrow distances between the specified vertices such that the hidden-surface vertices of the shadow model having the visible-surface vertices define a shape tapered in a moving direction.

13. A readable storage medium according to claim 9,

wherein the shadow model generating processing is performed to widen distances between the specified vertices such that the hidden-surface vertices of the shadow model having the visible-surface vertices define a shape swollen in a moving direction.

14. A readable storage medium according to claim 9, wherein the program further comprises a shadow creating processing for sorting the polygons forming the shadow model into front-facing polygons facing in a direction toward a viewpoint of a virtual camera and back-facing polygons facing in a direction opposite from the viewpoint of the virtual camera, and creating a shadow image in pixels which are pixels corresponding to the front-facing polygons minus pixels corresponding to the back-facing polygons.

15. A readable storage medium according to claim 9, wherein the program further comprises a shadow creating processing for creating a shadow image of the solid model using the shadow model, and a combining processing for storing the created shadow image of the solid model and an image created by applying rendering to the polygon models except the shadow model, and reading and combining the two stored images.

16. A readable storage medium according to claim 9, wherein the solid model is a character movable in height

direction in the simulated three-dimensional space.

17. A three-dimensional image processing method for generating a shadow model of a solid model formed by polygons each having vertex normal vectors, said method comprising the steps of:

sorting the respective vertices of the polygons forming the solid model into visible-surface vertices facing in a direction toward a light source and hidden-surface vertices facing in a direction opposite from the light source, and

deforming the solid model by moving the hidden-surface vertices in a propagating direction of rays from the light source.

18. A video game system comprising:

a three-dimensional image processing apparatus for generating a shadow model of a solid model formed by polygons each having vertex normal vectors, including:

vertex sorting means for sorting the respective vertices of the polygons forming the solid model into visible-surface vertices facing in a direction toward a light source and hidden-surface vertices facing in a direction opposite from the light source, and

shadow model generating means for deforming the solid model by moving the hidden-surface vertices in a

propagating direction of rays from the light source,

image display means for displaying images,

program storage means storing a game program data, and

externally operable operation means,

wherein the three-dimensional image processing apparatus displays images on the image display means in accordance with the game program data.

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